



Fire sign
Key Topics:
• fire [2]
• flood [3]
• remote sensing [4]


Improving land dryness measures and forecasts [5]
This project examined the use of detailed land surface models, satellite measurements and ground-based observations for the monitoring and prediction of landscape dryness. The research team developed a standalone prototype land surface modelling system, called Joint UK Land Environment Simulator based Australian Soil Moisture Information (JASMIN) to produce daily soil moisture analyses at 5km resolution and 4 soil layers. Verification against ground-based soil moisture observations shows that this prototype system is significantly more skilful than both the Keetch–Byram Drought Index and Soil Dryness Index. This project also aimed to improve applications such as fire danger mapping that may require soil moisture information at higher spatial resolution due to the large spatial variability of soil moisture in the landscape, and developed a simple yet skilful model to predict live fuel moisture content for the whole of Australia.

Project: detail Notabs


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Description

This project examined the use of detailed land surface models, satellite measurements and ground-based observations for the monitoring and prediction of landscape dryness. This project addresses a fundamental limitation in our ability to prepare for fires, floods and heatwaves and is directly linked to pre-event planning as well as forecasting of events. The research conducted in the present project solely focuses on the application of soil and land dryness/moisture in the context of fire danger and fire management practices. The lack of focus on flood and heatwave is circumstantial. The research priorities were set and driven by the requirements of the project end-users, all of them from various fire management agencies across Australia.

This research has developed a prototype, high-resolution soil-moisture analysis system called JASMIN, which is a significant improvement in accuracy compared to currently used models. It is based on research that examines the use of land surface models, remotely sensed satellite measurements and data assimilation techniques to improve the monitoring and prediction of soil dryness. The new information will be calibrated for use within the existing fire prediction systems. This retains the accuracy, temporal and spatial resolution of the new product without changing the overall climatology of Forest Fire Danger Index and other calculations based on soil moisture.

[Read the final report here.](#), [35]

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






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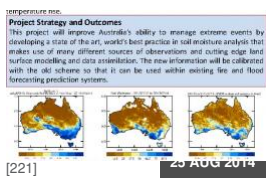
Publications

Year	Type	Citation
2021	Journal Article	Kumar, V. [16], Dharssi, I. [6], Yebra, M. [50] & Fox-Hughes, P. [8] Continental-scale prediction of live fuel moisture content using soil moisture information [51]. <i>Agricultural and Forest Meteorology</i> 264 , 12 (2021). DOI [90] Google Scholar [91] BibTeX [92]
2021	Report	Kumar, V. [16], Dharssi, I. [6] & Fox-Hughes, P. [8] Mitigating the effects of severe fire, floods and heatwaves through the improvements of land dryness measures and forecasts - final project report 2014-2015 [157]. (Bushfire and Natural Hazards CRC, 2021). Google Scholar [158] BibTeX [159] EndNote XML [160]
2020	Report	Kumar, V. [16], Dharssi, I. [6], Yebra, M. [50] & Fox-Hughes, P. [8] Exploring the soil moisture-live fuel moisture relationship [59]. (Bushfire and Natural Hazards CRC, 2020). Google Scholar [60] BibTeX [61] EndNote XML [62]
2019	Conference Paper	Fox-Hughes, P. [8] <i>et al.</i> Fire weather and prototype fire danger ratings for the Gell River fire, Tasmania [63]. <i>Bushfire and Natural Hazards CRC Research Day AFAC19</i> (2019). at <https://knowledge.bom.gov.au/afac19/> DOI [90] Google Scholar [91] BibTeX [92]
2019	Conference Paper	Kumar, V. [16], Dharssi, I. [6] & Fox-Hughes, P. [8] JASMIN: a high-resolution soil moisture analysis system for fire prediction [68]. <i>AFAC19 powered by INTERSCHUTZ - Bushfire and Natural Hazards CRC</i> (2019). Google Scholar [69] BibTeX [70] EndNote XML [71]
2019	Journal Article	Kumar, V. [16] & Dharssi, I. [6] Evaluation and calibration of a high-resolution soil moisture product for wildfire prediction and management [72]. <i>Agricultural and Forest Meteorology</i> 264 , 12 (2020). DOI [90] Google Scholar [91] BibTeX [92]
2019	Report	Kumar, V. [16], Dharssi, I. [6] & Fox-Hughes, P. [8] Disaggregation of JASMIN soil moisture product to 1KM resolution [77]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [78] BibTeX [79] EndNote XML [80]
2019	Report	Kumar, V. [16], Fox-Hughes, P. [8] & Dharssi, I. [6] Mitigating the effects of severe fires, floods and heatwaves through the improvements of land dryness measures and forecasts - annual project report 2014-2015 [157]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [158] BibTeX [159] EndNote XML [160]
2019	Report	Kumar, V. [16] & Dharssi, I. [6] Use of remote sensing measurements and data assimilation techniques to improve estimates of landscape dryness [85]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [86] BibTeX [87] EndNote XML [88]
2017	Journal Article	Kumar, V. [16] <i>et al.</i> Comparison of soil wetness from multiple models over Australia with observations [89]. <i>Water Resources Research</i> 53 , 633-646 (2017). DOI [90] Google Scholar [91] BibTeX [92] EndNote XML [93]
2017	Report	Kumar, V. [16] & Dharssi, I. [6] Downscaling of soil dryness estimates: a short review [94]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [95] BibTeX [96] EndNote XML [97]
2017	Report	Kumar, V. [16] & Dharssi, I. [6] Evaluation of daily soil moisture deficit used in Australian forest fire danger rating system [98]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [99] BibTeX [100] EndNote XML [101]
2017	Report	Kumar, V. [16], Dharssi, I. [6] & Holmes, A. [102] Mitigating the effects of severe fires, floods and heatwaves through the improvements of land dryness measures and forecasts: annual project report 2014-2015 [157]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [158] BibTeX [159] EndNote XML [160]
2017	Report	Dharssi, I. [6] & Kumar, V. [16] JASMIN: A prototype high resolution soil moisture analysis system for Australia [107]. (Bureau of Meteorology, 2017). at <http://www.bom.gov.au/research/publications/research-reports/> DOI [90] Google Scholar [91] BibTeX [92] EndNote XML [93]
2016	Conference Paper	Rumsewicz, M. [112] Research proceedings from the 2016 Bushfire and Natural Hazards CRC and AFAC conference [113]. <i>Bushfire and Natural Hazards CRC & AFAC annual conference 2016</i> (Bushfire and Natural Hazards CRC, 2016). Google Scholar [114] BibTeX [115] EndNote XML [116]
2016	Conference Paper	Dharssi, I. [6] & Kumar, V. [16] A high-resolution land dryness analysis system for Australia [117]. <i>AFAC16</i> (Bushfire and Natural Hazards CRC, 2016). Google Scholar [118] BibTeX [119] EndNote XML [120]
2016	Journal Article	Holgate, C. M. [121] <i>et al.</i> Comparison of remotely sensed and modelled soil moisture data sets across Australia [122]. <i>Remote Sensing of Environment</i> 186 , (2016). DOI [123] Google Scholar [124] BibTeX [125] EndNote XML [126]
2016	Report	Dharssi, I. [6] & Kumar, V. [16] Mitigating the effects of severe fires, floods and heatwaves through the improvements of land dryness measures and forecasts: Annual project report 2015-2016 [157]. (Bushfire and Natural Hazards CRC, 2016). Google Scholar [158] BibTeX [159] EndNote XML [160]
2015	Conference Paper	Dharssi, I. [6], Kumar, V. [16], Yeo, C. [10], Bally, J. [21] & Kepert, J. [12] Mitigating the Effects of Severe Fires, Floods and Heatwaves Conference Paper 2014 [131]. <i>Bushfire and Natural Hazards CRC & AFAC annual conference 2015</i> (Bushfire and Natural Hazards CRC, 2015). Google Scholar [132] BibTeX [133] EndNote XML [134]
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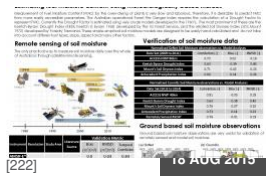
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27 Oct 2014	Modelling the fire weather of the Coonabarabran fire 13 January [170]		fire [2], flood [3], mitigati
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17 Oct 2019	Mitigating the effects of severe fires, floods and heatwaves through the improvements of land dryness measures and forecasts [211]	 1.41 MB	[212] (1.41 MB) [68], land ma
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25 Nov 2020	Satellites to help show when the bush is ready to burn [216]		fire [2], remote sensing [4
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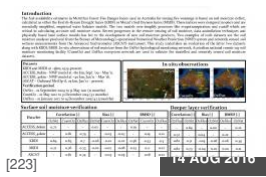


Mitigating the effects of severe fires, floods and heatwaves through the improvements of land dryness measures and forecasts [221]



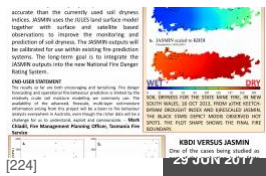
Sources of Soil Dryness Measures and Forecasts
[222]
REMOTE
SENSING [4], SOIL MOISTURE [176]

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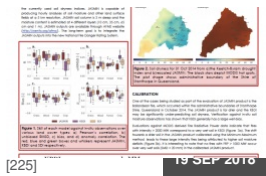
Soil dryness in fire danger rating: time for a change in approach?
[223]
FIRE SEVERITY [220]

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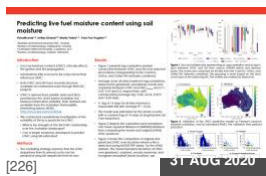
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[224]
FIRE [2], FLOOD [3]

New approaches are available to calculate soil dryness more accurately through the use of satellite remote...



A new soil dryness product for fire prediction applications
[225]
FIRE [2], FLOOD [3]
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[226]
FORECASTING [168]

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[14]

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[233]

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